



DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R8–ES–2010–0049]

[4500030113]

RIN 1018–AX89

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Arctostaphylos franciscana* (Franciscan manzanita) Throughout Its Range

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine that *Arctostaphylos franciscana* (Franciscan manzanita) meets the definition of an endangered species under the Endangered Species Act of 1973, as amended (Act). This final rule implements the Federal protections provided by the Act for this species. We are

simultaneously publishing a proposed rule to designate critical habitat for *Arctostaphylos franciscana* in a separate **Federal Register** notice.

DATES: This rule becomes effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: This final rule is available on the Internet at <http://www.regulations.gov> and at the Sacramento Fish and Wildlife Office. Comments and materials received, as well as supporting documentation used in the preparation of this rule, will be available for public inspection, by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage, Room W-2605, Sacramento, CA, 95825; 916-414-6600 (telephone); 916-414-6712 (facsimile).

FOR FURTHER INFORMATION CONTACT: Susan Moore, Field Supervisor, Sacramento Fish and Wildlife Office (see **ADDRESSES** section). If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. This is a final rule to list *Arctostaphylos franciscana* as an endangered species under the Endangered Species Act. Under the Act, if a species is determined to be an endangered or threatened species we are required to promptly publish in the Federal Register and make a determination on our proposal within one year. We were petitioned in 2010 to list *A. franciscana* as an endangered or threatened species. We determined in our 12-month finding that listing was warranted, and we proposed to list the species as an endangered species in September 2001. This final rule constitutes our final determination for this species as required by the Act.

The basis for our action. Under the Endangered Species Act, we are required to determine whether a species is endangered or threatened because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We reviewed all available scientific and commercial information pertaining to these factors in our status review of the species and determined that the species was limited to one plant remaining in the wild. We proposed that the species was endangered due to threats in the five factors, as follows. The primary threat to *Arctostaphylos franciscana* is from the present or threatened destruction, modification, or curtailment of the species' habitat or range. All original occupied habitat of the species has been lost, and its current range has been reduced to a single location that supports a single *A. franciscana* plant. Furthermore, limited suitable habitat remains available to support a viable population of

the species. The remaining plant is vulnerable to overcollection or damage if visitors harvest cuttings or seeds. Sudden oak death, which is caused by the pathogen *Phytophthora cinnamomi*, and infections caused by other *Phytophthora* species are serious threats to *Arctostaphylos franciscana* because only one plant occurs in the wild and the diseases are easily spread. Predation is an ongoing but lesser threat. Additional threats include climate change, altered fire regime, soil compaction from visitor use, vandalism, loss of genetic diversity, loss of pollinators, stochastic events, effects of small population size, and hybridization. In the proposed rule, we considered these threats to be significant and ongoing, but we did not find that we had sufficient information to determine critical habitat at the time. In this final rule, we utilize public comments and peer review to inform our final determination, as required under the Act.

Peer review and public comments. In this final rule, we present and respond to peer reviewer and public comments. We obtained peer reviews from knowledgeable individuals with the scientific expertise to review our technical assumptions, analysis, adherence to regulations, and whether or not we had used the best available information. These peer reviewers generally concurred with our methods and conclusions, and they provided additional information, clarifications, and suggestions to improve this final rule. In particular, peer reviewers provided information on the physical and biological features required by the species, and on locations of remnant natural habitat that retained these features, suggesting that proposal of critical habitat would be determinable and prudent. Accordingly, a proposed rule to designate critical habitat is being published concurrently with this final rule to list the species as endangered.

Background

It is our intent to discuss only those topics directly relevant to the listing of *Arctostaphylos franciscana* under the Act (16 U.S.C. 1531 *et seq.*) in this final rule. For further information on the species' biology and habitat, population abundance and trend, distribution, demographic features, habitat use and conditions, threats, and conservation measures, please see the September 8, 2011, proposed listing for the species (76 FR 55623) published in the **Federal Register**, or the Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula (Service 2003). These documents are available from the Environmental Conservation Online System (ECOS) (<http://ecos.fws.gov/ecos>), the Sacramento Fish and Wildlife Office web site (<http://www.fws.gov/sacramento/>), or from the Federal eRulemaking Portal (<http://www.regulations.gov>).

Prudency Determination

In our proposed listing rule for *Arctostaphylos franciscana* (76 FR 55623; September 8, 2011), we stated that we believed that critical habitat was not determinable at the time of the proposal due to a lack of knowledge of what physical or biological features were essential to the conservation of the species, or what other areas outside the site that is currently occupied may be essential for the conservation of the species. Subsequently, we requested information from the public during the public comment period and solicited information from peer reviewers on whether the determination of

critical habitat was prudent and determinable. We also asked for information about the physical or biological features that are essential to the conservation of the species and what areas contained those features or were otherwise essential for the conservation of the species. Based on the information we received on the physical or biological features for *A. franciscana*, and information on areas otherwise essential for the species, we have determined that the designation of critical habitat is prudent and determinable. We are therefore proposing critical habitat elsewhere in today's **Federal Register**. For more information regarding our determination to designate critical habitat please see our response to comments below and the proposed rule to designate critical habitat for *A. franciscana* published in the Proposed Rules section of today's **Federal Register**.

Species Information

Arctostaphylos franciscana is a low, spreading-to-ascending, evergreen shrub in the heath family (Ericaceae) that may reach 0.6 to 0.9 meters (m) (2 to 3 feet (ft)) in height when mature (Chasse *et al.* 2009, p. 5). Its leaves are about 1.5 to 2 centimeters (cm) (0.6 to 0.8 inches (in)) long, are isofacial (have the same type of surface on both sides), and are oblanceolate (longer than they are wide and wider towards the tip) (Eastwood 1905, p. 201; Chasse *et al.* 2009, p. 39). Its mahogany brown fruits are about 6 to 8 millimeters (mm) (0.24 to 0.32 in) wide, while its urn-shaped flowers measure about 5 to 7 mm (0.2 to 0.28 in) long (Wallace 1993, p. 552; Service 2003, p. 57).

A closely related species, *Arctostaphylos hookeri* ssp. *ravenii* (Presidio or Raven's manzanita), which was federally listed as endangered on October 26, 1979 (44 FR 61909), looks similar but has a growth habit that is more prostrate, leaves that are more rounded, fruits that are smaller and less red in color, and flowers that are smaller and more spherical (Service 2003, pp. 55, 57). *Arctostaphylos hookeri* ssp. *ravenii* has recently undergone a taxonomic revision to *A. montana* ssp. *ravenii*, and we will be referring to the listed species by this name throughout this rule (see Genetics and Taxonomy section below). Another somewhat similar appearing species, though not as closely related, is *A. uva-ursi* (bearberry), which can be distinguished by its lack of isofacial leaves (Chasse *et al.* 2009, p. 39).

In the wild, *Arctostaphylos franciscana* is an obligate-seeding species (it reproduces primarily from seed rather than from burls) (Vasey 2010, p. 1). *Arctostaphylos* (manzanita) species are members of the chaparral plant community, which have a variety of triggers for seed germination including heat, smoke, and light (Keeley 1987, p. 434). *Arctostaphylos* species have germinated after being exposed to charate (ground charred wood) (Keeley 1987, pp. 435, 440), which suggests that fire or conditions that simulate fire stimulate germination of the seeds.

Based on work with other species of *Arctostaphylos*, the establishment of successful populations of *A. franciscana* may require the presence of a pollinator community (primarily bumblebees (*Bombus* spp.) but also other insects), a fruit dispersal community (primarily rodents), and a mutually beneficial soil mycorrhizal fungi

community (see Historical Distribution and Habitat below) (Parker 2011, p. 1). The seeds of *Arctostaphylos* are dispersed primarily by rodents that consume the fruits, but also by other mammals, including coyotes (*Canis latrans*) and foxes (T. Parker 2011, pers. comm.; Vasey 2011a, p. 1). Seed-eating animals such as coyotes, gray foxes (*Urocyon cinereoargenteus*), red foxes (*Vulpes vulpes*), raccoons (*Procyon lotor*), California quail (*Callipepla californica*), and rodents such as the California vole (*Microtus californicus*) are known to occur on the Presidio of San Francisco (Presidio), a unit of the National Park System, on the San Francisco peninsula where *A. franciscana* is found (National Park Service (NPS) 2012). Animals such as coyotes and foxes eat the *Arctostaphylos* fruit and may travel long distances before depositing their scat. Any undigested fruit left in the scat can then be harvested by rodents and either eaten or buried. Parker (2010b, p. 1) found that 70 percent of the fruits buried by rodents were located deeper than 2 cm (0.78 in), which is the maximum soil depth at which seeds are typically killed by wildfire. Seed has been removed from the wild plant, and, although it has not been directly observed, California voles have been trapped near the wild plant and are likely responsible for the seed harvesting (Carlen 2012, p. 1; Estelle 2012d, p. 1).

Listed Entity Analysis

The *Arctostaphylos franciscana* plants that exist in cultivation fall into three categories: (1) Cuttings and rooted specimens collected from the Laurel Hill Cemetery and transplanted to various managed botanical gardens in San Francisco, Berkeley, and Claremont prior to 1947; (2) specimens currently propagated in greenhouses from

cuttings and layers taken from the wild plant in 2010; and (3) specimens, some of which may be of unknown origin, sold in the nursery trade or transplanted into home gardens. We consider the single wild plant and plants identified in (1) and (2) above to be the listed entity under the Act. Our rationale for not including plants identified in item (3) above is outlined below.

The *Arctostaphylos franciscana* plants found in botanical gardens may represent from one to six genetically distinct plants other than the single wild plant (Chasse *et al.* 2009, p. 7; Chasse 2011a, p. 1; Chasse 2011b, p. 1; Vasey 2011b, pp. 2, 3), and cuttings from those plants may contribute genetic material to efforts to expand the number of wild plants. The botanical garden plants are not considered part of the wild population and, therefore, are not considered in the assessment of species status, although they will be considered to be listed when this final rule becomes effective (see the **DATES** section above). The cuttings and layers collected from the wild plant currently propagated in greenhouses are being considered in the assessment of the species' status. These cuttings from the wild plant will be planted with *A. franciscana* specimens propagated in botanical gardens to establish additional populations of the species. We have concluded that the third category of plants, those cultivated for private or commercial uses, will not aid in the conservation or recovery of the species in the wild because some cultivated plants may be hybrids and bred for landscape use and thus offer minimal contribution to conservation.

Current Distribution

In October 2009, an ecologist identified a plant growing in a concrete-bound median strip along Doyle Drive in the Presidio as *Arctostaphylos franciscana* (Chasse *et al.* 2009, pp. 3, 4; Gluesenkamp 2010, p. 7). The plant's location was directly in the footprint of a roadway improvement project designed to upgrade the seismic and structural integrity of the south access to the Golden Gate Bridge (California Department of Transportation (Caltrans) *et al.* 2009, p. 1; Chasse *et al.* 2009, p. 10).

Several agencies, including the Service, established a Memorandum of Agreement (MOA) and conservation plan for the species (see *Previous Federal Actions* section below) (Caltrans *et al.* 2009). The conservation partners concluded that leaving the plant undisturbed at its original site would compromise public safety and cultural resources by the potential curtailment or redesign of the roadway improvement project (Chasse *et al.* 2009, pp. 9, 10).

The conservation plan evaluated potential translocation sites, established procedures for preparation of the new site and for the translocation itself, and called for management and monitoring (both short- and long-term) of the translocated plant, with the goal of eventually establishing self-sustaining populations of the species in the wild (Chasse *et al.* 2009, pp. 23–27, 29–30). Following recommendations in the conservation plan, the *Arctostaphylos franciscana* plant was moved successfully to a new site within the Presidio in January 2010. The Presidio site was chosen after careful consideration of its appropriate soil type and the management and monitoring capabilities of the NPS and

the Presidio Trust. Subsequent monitoring reports indicate the translocated plant continues to do well at its new location (Yam 2010, pp. 1, 3–14; Young 2010a, p. 1; Young 2012, p. 1).

Historical Distribution and Habitat

Known historical occurrences and collections of *Arctostaphylos franciscana* are from serpentine maritime chaparral, a plant community dominated by *Arctostaphylos* and *Ceanothus* (California lilac) species, on the San Francisco peninsula. This area is part of a region that Willis Linn Jepson named the Franciscan Area, one of 10 areas he considered to have the highest concentration of endemic plant species in California (Jepson 1925, pp. 11–14). An endemic species is one that is native to, and restricted to, a particular geographical area. Native habitats on the San Francisco peninsula have been largely converted to urban areas of the City of San Francisco, and habitat that might have supported *A. franciscana* is now mostly lost to development or habitat conversion from the introduction of nonnative plant species (Chasse 2010, p. 2; Gluesenkamp 2010, p. 7; Chasse 2011c, p. 1).

Chasse (2009, pp. 6, 7) has noted that information on the plant community that historically included *Arctostaphylos franciscana* is largely missing from the literature. Early records describe the species as growing “on rocky ground” (Eastwood 1905, p. 202), on “bare, stony bluff on Laurel Hill Cemetary [sic]” (Brandegge 1908), and with coast live oak (*Quercus agrifolia*), coast blue blossom (*Ceanothus thyrsiflorus*), and

coyote brush (*Baccharis pilularis*) (Wieslander 1938). *Arctostaphylos franciscana* was also observed “forming flat masses over serpentine outcroppings and humus-filled gravel and flopping down over the sides of gray and chrome rocks. *Ericameria*, *Baccharis*, Ferns, Buckwheats, and Golden Yarrow grow among it; and over it stand Toyons and Live Oaks.” Additionally, *A. montana* ssp. *ravenii* was found at nearly all *A. franciscana* locations. These observations, along with the geology and climate of historical sites, indicate that the species’ historical community likely consisted of a mosaic of coastal scrub, barren serpentine maritime chaparral, perennial grassland, and occasional woodlands of coast live oak and toyon shrubs and small trees (Chasse 2009, pp. 6, 7).

Arctostaphylos franciscana is considered to be endemic to the San Francisco peninsula, and historically occurred in areas with serpentine soils, bedrock outcrops, greenstone, and mixed Franciscan rock, typically growing in mixed populations with *A. montana* ssp. *ravenii* (Service 2003, pp. 95, 96; Chasse *et al.* 2009, p. 6). The Doyle Drive *A. franciscana* site was comprised of disturbed soil over serpentinite (Chasse *et al.* 2009, p. 3). Serpentine soil restricts the growth of many plants due to its high nickel and magnesium concentrations, and thus tends to support unique plant communities (Brooks 1987, pp. 19, 53; Service 2003, p. 16) because relatively few plant species can tolerate such soil conditions. These conditions generally result in semibarren soil and a lack of competing plants, which benefits serpentine-tolerant plants (Bakker 1984, p. 79) such as *A. franciscana*.

The coastal upland habitat of *Arctostaphylos franciscana* is influenced by cool, humid conditions and frequent summer fog. Summer fog is important to upland coastal vegetation and partly determines the distribution of coastal species (Johnstone and Dawson 2010, p. 4533). Besides serpentine soil and cool air temperatures (Parker 2010c, p. 1), summer fog is one of the primary habitat requirements for *A. franciscana* (Vasey 2010, p. 1). Summer fog results from two phenomena upwelling of cold coastal ocean water and temperature inversion of hot air flowing toward the ocean over a cool humid marine air layer below (Johnstone and Dawson 2010, p. 4533; Vasey 2010, p. 1). Fog reduces sunlight and air temperature, and raises humidity. Summer fog provides a source of water for plants, including *Arctostaphylos* species, by condensing in the plant canopy and falling directly as water to the soil where it is taken up by the plant's roots or directly by leaves (Johnstone and Dawson 2010, p. 4533; Vasey 2010, p.1).

Historically, the maritime serpentine chaparral plant community, of which *Arctostaphylos franciscana* is a part, may have been present in the southeastern portion of the San Francisco area (for example, Potrero Hill and Bayview Hill), but the cumulative effects of burning by native Americans, grazing during the Spanish/Mexican period, and later more grazing and firewood gathering during the U.S. military period may have converted the maritime chaparral to grassland or depauperate coastal scrub (Chasse 2010, p. 2). Prior to 1947, *A. franciscana* was known from three locations: the Masonic and Laurel Hill Cemeteries in San Francisco's Richmond District, and Mount Davidson in south-central San Francisco (Service 2003, pp. 16, 62, 95; Chasse *et al.* 2009, p. 4). Unconfirmed sightings were also noted at a possible fourth location near Laguna and

Haight Streets (Chasse 2012, p. 1). By 1947, the Masonic and Laurel Hill Cemetery sites were removed and the grounds were destroyed in preparation for commercial and urban development (Chasse *et al.* 2009, p. 7). The Mount Davidson and Laguna and Haight Streets locations were lost to urbanization as well. Until October 2009, *A. franciscana* had not been recorded in the wild since 1947 (Chasse *et al.* 2009, pp. 3, 7), although no systematic surveys are known to have taken place to search for potential remaining individuals (Chasse 2010, p. 1).

Cultivated *Arctostaphylos franciscana*

Between 1930 and 1947, prior to the loss of the wild plants, botanists collected cuttings and rooted specimens from confirmed wild *Arctostaphylos franciscana* plants, possibly representing between one and six distinct genotypes, and propagated them in botanical gardens (Chasse *et al.* 2009, p. 7; Chasse 2011a, p. 1; Chasse 2011b, p. 1; Service 2003, p. 96; Vasey 2011b, p. 2). The number of distinct genotypes depends on whether the botanical garden specimens were started from cuttings of the same individual (which would mean multiple plants have identical genotypes (genetic constitutions)), or whether each specimen originated from a separate plant (in which case they would have different genotypes) (Chasse 2011a, p. 1; Chasse 2011b, p. 1; Vasey 2011b, pp. 2, 3).

Modern collections of this plant at East Bay Regional Park District's Botanical Garden at Tilden Regional Park, San Francisco Botanical Garden (formerly known as Strybing Arboretum), Rancho Santa Ana Botanic Garden, Claremont, and University of

California (UC) Berkeley Botanical Garden include some of the original specimens from Laurel Hill, as well as specimens propagated vegetatively after the species was thought to be extinct in the wild (Chasse *et al.* 2009, pp. 6–8). Accession records for the botanical garden specimens indicate that some specimens collected and planted prior to 1947 did not survive and others are duplicates of original collections, leaving possibly only two specimens confirmed to have been original plants transplanted from Laurel Hill (Chasse 2011b, p. 1; Smisko 2012, p. 1). Further genetic work will verify whether plants with differing morphological features prove to be additional *Arctostaphylos franciscana* individuals. Although some of the botanical garden specimens may have different genotypes, which is generally the result of sexual reproduction (sprouting from seed) rather than clonal reproduction (vegetative reproduction from cuttings or plant parts other than seeds), all of the botanical garden specimens are considered to be *A. franciscana* until further genetic work can be conducted. The number of existing distinct genotypes cannot currently be determined because a suitable genetic sampling technique has not yet been developed (Chasse 2011a, p. 1).

Under the conservation plan for the relocated wild plant, cuttings and rooted specimens from the wild plant are also being cultivated. Cuttings from the plant, both nonrooted stems and layering stems (stems that have rooted at their leaf nodes), were taken for vegetative propagation prior to translocation of the *Arctostaphylos franciscana* plant in January 2010 (Chasse *et al.* 2009, pp. 10–16, 40–42, Young 2010a, p. 1). This material was distributed to seven locations, including UC Berkeley Botanic Garden, Regional Parks Botanic Garden, UC Santa Cruz Botanical Garden, San Francisco

Botanical Garden, Cal Flora Nursery, Presidio Nursery, and the Presidio Trust Forester (Young 2011, p. 1 of attachment 2). As of February 2012, 351 clones continue to survive at these locations (Young 2012, p. 1). A total of 1,346 *A. franciscana* seeds were collected from the plant in 2009, before it was transplanted; an estimated 2,100 seeds were collected in July and August 2010; and 19 seeds were collected in 2011 (Frey 2010, p. 1; Young 2010a, p. 1; Young 2012, p. 1). The numbers of seeds collected are estimates based on weight of seed collected (Laskowski 2012, p. 1). No attempts have yet been made to germinate *A. franciscana* seeds (Young 2012, p. 1). Two rooted *A. franciscana* cuttings were outplanted to managed sites at the UC Santa Cruz Arboretum in January 2011 (Kriegar 2011, unpaginated). The conservation plan calls for eventual propagation of seeds (including any seeds collected from the soil around the plant's original location), and for genetic testing of resulting plants. Seeds fertilized in the wild could result from cross-pollination from another individual *Arctostaphylos franciscana* or a closely related species to produce a genetically unique individual (Chasse *et al.* 2009, p. 13). Additionally, because the roots of most *Arctostaphylos* individuals establish a mutually beneficial association with mycorrhizal fungi in the soil, the conservation plan establishes means by which the soil for propagating cuttings and seeds should be inoculated with spores from such fungi (Chasse *et al.* 2009, p. 9). Propagation of *A. franciscana* seed and inoculation of seeds and cuttings by mycorrhizal fungi have not yet occurred. Soil surrounding the wild plant has been examined for presence of a seedbank, but no *A. franciscana* seeds have been found (Young 2011, p. 1; Young 2012, p.1).

Genetics and Taxonomy

At one time *Arctostaphylos franciscana* and *A. montana* ssp. *ravenii* were considered to be subspecies of *A. hookeri* (Hooker's manzanita). However, recent taxonomic revisions have established *A. montana* ssp. *ravenii* and *A. franciscana* as separate species. These revisions have been based primarily on genetic comparisons, including the fact that *A. franciscana* is diploid while *A. montana* ssp. *ravenii* is tetraploid (having four sets of chromosomes, 26 chromosome pairs) (Service 2003, p. 95; Parker *et al.* 2007, pp. 149, 150; Chasse *et al.* 2009, p. 6). The identification of the wild plant as *A. franciscana* has since been confirmed with 95 percent confidence based on morphological characteristics (Chasse *et al.* 2009, pp. 3, 4; Vasey and Parker 2010, pp. 1, 5). Additional tests indicate that the plant is diploid, consistent with *A. franciscana* (Vasey and Parker 2010, p. 6). Molecular genetic data also indicate that the plant is *A. franciscana* (Parker 2010a). Based on the best available scientific information, we consider the individual found along Doyle Drive in October 2009 to be *A. franciscana* (Vasey and Parker 2010, pp. 1, 5–7).

Previous Federal Actions

Arctostaphylos franciscana was originally proposed for listing as an endangered species under the Act in 1976 (41 FR 24524; June 16, 1976). In 1980, it was included in the list of Category 1 candidates for listing as one of the taxa retaining a high priority for addition to the list, subject to confirmation of extant wild populations. At that time, the species was thought to be extinct in the wild, although it was known to be extant in

cultivation (45 FR 82479; December 15, 1980). It was included as a species of concern in the Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula (Service 2003, pp. 95–96).

On December 23, 2009, we received a petition dated December 14, 2009, from Wild Equity Institute, Center for Biological Diversity, and California Native Plant Society requesting that *Arctostaphylos franciscana* be listed as endangered on an emergency basis under the Act and that critical habitat be designated. Included in the petition was supporting information regarding the species' taxonomy and ecology, historical and current distribution, present status, and actual and potential causes of decline. On January 26, 2010, we acknowledged the receipt of the petition in a letter to Wild Equity Institute. In that letter, we responded that we had reviewed the information presented in the petition and determined that issuing an emergency rule to temporarily list the species, under section 4(b)(7) of the Act, was not warranted. Our rationale for this determination was that, although only a single plant of this species remained in the wild, the individual had recently been transplanted to a new location on Federal land. Additionally, a conservation plan (Chasse *et al.* 2009, pp. 1–44) and associated MOA (cited herein as Caltrans *et al.* 2009) signed by five Federal and State wildlife and land management agencies (conservation partners) successfully addressed the concerns raised by the petition to the extent that none of those concerns constituted an “emergency posing a significant risk to the well-being of the species” (50 CFR 424.20(a)). The Federal agencies participating in the MOA are the NPS and the Service. The State of California is represented by Caltrans and the California Department of Fish and Game (CDFG).

The Presidio Trust, a wholly owned government corporation that jointly manages the Presidio with NPS, also participates (71 FR 10608; March 2, 2006).

The transplanted plant is considered to be the single remaining plant in the wild, despite having been transplanted to the Presidio. The original habitat of the plant was threatened by the ongoing redevelopment of Doyle Drive, but that threat was removed by moving the plant to a new location (translocation). Potential immediate threats in the new location, including the danger that the plant might not survive the move and transplantation, were addressed by provisions in the conservation plan for collecting and propagating rooted clones, seeds, and cuttings from the original plant prior to translocation. The conservation plan provides for the long-term propagation, and eventual reestablishment in wild populations, of all remaining genetic lines, including those from the surviving wild plant and from the individuals located in two botanical gardens, which were collected from historically confirmed locations. It also includes long-term monitoring provisions. While these provisions do not remove the need for further review of the species' status, they appear to be effective for protecting the species in the short term.

We published a 90-day finding in the **Federal Register** on August 10, 2010 (75 FR 48294), in which we found that the petition presented substantial scientific or commercial information indicating that listing this species may be warranted. On June 14, 2011, Wild Equity Institute filed a complaint that alleged that, given our 90-day finding, the Service had failed to make the required 12-month finding on the petition in a

timely manner. On September 8, 2011, we published a combined 12-month finding and proposed rule in the **Federal Register** in which we determined that listing *Arctostaphylos franciscana* was warranted, and, as a result, we proposed to list the species as endangered (76 FR 55623). We also stated that we did not find critical habitat to be determinable at that time, and requested information and comments on whether designation of critical habitat for the species was prudent and determinable.

The Presidio is under joint management by the Golden Gate National Recreation Area (GGNRA), a part of NPS, and the Presidio Trust. The wild *Arctostaphylos franciscana* plant is located in the portion of the Presidio managed by the Presidio Trust. The plant is considered to be wild because it has been moved to an undeveloped area of the Presidio that is managed as natural habitat. Although the plant is currently receiving care (monitoring and insect removal) associated with its transplantation and recent infestation by insects, it is not receiving the level of protection, water, or nutrients given to the plants in botanical gardens or to those within the nursery trade.

Summary of Comments and Recommendations

In the proposed rule published on September 8, 2011 (76 FR 55623), we requested that all interested parties submit written comments on the proposal by November 7, 2011. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. A newspaper notice inviting general public comment for a period of 15

days was published in the San Francisco Chronicle on June 5, 2012. A question and answer sheet and news release regarding the species was posted online on our website for the public. We did not receive any requests for a public hearing.

During the comment periods for the proposed rule, we received eight comment letters directly addressing the proposed listing of *Arctostaphylos franciscana* as endangered. All public commenters supported listing the species as endangered. Three commenters supported designation of critical habitat and provided opinions on the value of critical habitat designation and the threats resulting from lack of this designation. One commenter opposed critical habitat designation. All substantive information provided during the comment periods has either been incorporated directly into this final determination or is addressed below.

Peer Review

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited expert opinion from five knowledgeable individuals with scientific expertise that included familiarity with *Arctostaphylos franciscana* and its habitat, biological needs, and threats. We received responses from four of the peer reviewers.

We reviewed all comments received from the peer reviewers for substantive issues and new information regarding the listing and critical habitat of *Arctostaphylos franciscana*. The peer reviewers generally concurred with our methods and conclusions

regarding listing and provided additional information, clarifications, and suggestions to improve the final rule; however, three reviewers disagreed with our comments that designation of critical habitat was not prudent or determinable, and they provided supporting information regarding critical habitat. The fourth peer reviewer indicated that publicizing the location of the transplanted plant could increase the threat of infection by *Phytophthora* species. Additionally, this peer reviewer noted that the threat to *A. franciscana* was greater than stated in the proposed rule due to the presence of other species of *Phytophthora* in the San Francisco Bay area. Peer reviewer comments are addressed in the following summary and incorporated into the final listing rule as appropriate. A proposed rule to designate critical habitat for *A. franciscana* is published in the Proposed Rules section of today's **Federal Register**. Please see that proposed rule for information on submitting a comment on our proposed designation of critical habitat for *A. franciscana*.

Peer Reviewer Comments

(1) *Comment:* All peer reviewers provided comments on conservation measures, recommendations for outplanting cuttings and selection of planting sites, and additional information on threats to the species from the five factors discussed below in **Summary of Factors Affecting the Species**.

Our Response: Recommendations regarding outplanting and selection of planting sites have been reviewed for the proposed critical habitat and will be considered during

the development of a recovery plan. All other appropriate information was incorporated into this final rule.

(2) *Comment:* Three peer reviewers and three public commenters stated that designation of critical habitat is prudent and determinable.

Our Response: Critical habitat is defined in section 3 of the Act as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features that are essential to the conservation of the species, and which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The peer reviewers provided information on the ecological requirements of *Arctostaphylos franciscana* and areas with the highest potential for establishing new populations. Based on this information, we have determined that the designation of critical habitat is prudent and determinable. All known remaining historic locations as well as the site of the transplanted wild plant have been evaluated, and the areas that have met our criteria to be included as proposed critical habitat have been identified. We are proposing to designate critical habitat for the species concurrently with this final rule. That proposal is published in the Proposed Rules section of today's **Federal Register**. Please see that proposed rule for information on submitting a comment on our proposed designation of critical habitat for *A. franciscana*.

(3) *Comment:* Two peer reviewers disagreed with our statement that small sites on the order of 0.4 hectare (ha) (1 acre (ac)) may not be suitable for *Arctostaphylos franciscana*. One peer reviewer stated that while small sites may facilitate the growth of nonnative plant species, *A. franciscana* would be started from cuttings, not from seed, and management efforts could easily accommodate competition from nonnative plants, as established woody species are not easily displaced by weeds. The second peer reviewer noted that there are many natural occurrences of rare *Arctostaphylos* species existing in small, isolated remnants of habitat where soils and climate are suitable.

Our Response: Some invasive plant species in the Presidio and in other San Francisco peninsula areas have been shown to be difficult to control. For example, on Mount Davidson, which previously supported a population of *Arctostaphylos franciscana*, invasive plant species, including *Eucalyptus* spp., invasive ivy, and other species, have largely displaced native vegetation on portions of the site. We agree that some rare species of *Arctostaphylos* have persisted on small parcels of suitable habitat; however, in order to maximize the potential of establishing multiple, successful populations of *A. franciscana*, selection of suitable sites that require the least amount of long-term maintenance and promise the greatest opportunity for growth is necessary. However, we will evaluate small sites during our process to designate critical habitat for the species.

(4) *Comment:* Two peer reviewers questioned our statement under Factor A in the proposed rule that small, isolated areas of habitat can be drier than larger ones due to evaporation and lack of surrounding vegetation. One reviewer stated that this does not apply to small urban or near-urban sites because hard surfaces such as asphalt and cement provide additional runoff and available moisture in these areas.

Our Response: Many of the remnant parcels of potential habitat on the peninsula are isolated and surrounded by urban development or nonnative landscaping rather than native vegetation. One of the general effects of this abrupt transition from natural habitat to urban landscape or hard surfaces is a change in the abundance and distribution of species in the natural habitat due to physical conditions near the edge (the edge effect). These conditions include desiccation and changes in wind and light. We agree with one peer reviewer's premise that hard surfaces such as rooftops, streets, and parking lots increase urban runoff; however, our understanding is that when rain or irrigation water falls on urban hard surfaces, it flows predominately into storm water control systems, including gutters and storm drains, and is carried away from urban areas rather than being absorbed into the soil and providing more moisture to plants.

(5) *Comment:* We stated under Factor A that remaining areas of greenstone and serpentine habitat on the peninsula are frequently 0.4 ha (1 ac) or less in size and may no longer be appropriate sites for re-establishment of *Arctostaphylos franciscana* due to fragmentation and loss of native plant diversity in the small remnant areas. One peer reviewer pointed out the loss of native diversity in existing stands of vegetation is not a

relevant argument because new populations of *A. franciscana* would be newly created in the small sites.

Our Response: We appreciate the reviewer's point and agree that if small remnant habitat areas were to support *Arctostaphylos franciscana*, it would be through restoration with newly assembled populations of the species, which could permit establishment of other naturally co-occurring natives. However, we remain concerned that small sites may insufficiently support the pollinator, fruit-dispersal, and mycorrhizal communities that are thought to contribute to successful establishment of the species. We will be looking at all potential sites when selecting locations for outplanting.

(6) *Comment:* One peer reviewer noted that the threat to *Arctostaphylos franciscana* from nonnative, root-rotting *Phytophthora* species is greater than noted under Factor C in the proposed rule. He noted that species of *Phytophthora* differ in their ecological requirements, such as optimum temperature range. Several species of *Phytophthora* have become established in a variety of San Francisco Bay area microclimates and could be introduced to the vicinity of *A. franciscana*. He also noted that other factors discussed under Factor E, including climate change, soil compaction, and low genetic diversity, have the potential to increase the risk to the existing wild plant from *P. cinnamomi* and other *Phytophthora* species.

Our Response: This information has been incorporated into this final rule. Please see Factor C discussion on threats to *Arctostaphylos franciscana* associated with disease below.

(7) *Comment:* One peer reviewer noted that the general strategy to recover *Arctostaphylos franciscana* should be two-fold: (A) Identify other genotypes of *A. franciscana* that have been cultivated in botanical gardens and use their cuttings to propagate large numbers of plants for future outplantings in restored habitats, and (B) identify and secure sites for outplanting these clones and create as many populations within the historical range as feasible.

Our Response: This information has been incorporated into this final rule where appropriate and will be considered during development of the proposed critical habitat and recovery actions for the species.

(8) *Comment:* One peer reviewer noted that the potential risks of failure of small, restored populations are outweighed by benefits of having a large number of isolated populations within the range of *Arctostaphylos franciscana*. These populations would buffer the wild *A. franciscana* from the threats noted in this rule, including disease, disturbance, predation, and climate change. The peer reviewer further noted that having many scattered populations will optimize the potential for at least some populations to adjust to climate change.

Our Response: We concur with this opinion and are considering this during our development of proposed critical habitat and recovery actions for the species.

Comments from States

Section 4(i) of the Act states, “the Secretary shall submit to the State agency a written justification for his failure to adopt regulations consistent with the agency’s comments or petition.” No comments were received from the State regarding the proposal to list *Arctostaphylos franciscana* as an endangered species.

Federal Agency Comments

No comments were received from any Federal agencies.

Public Comments

(9) *Comment:* All seven commenters noted that the species should be listed and protected in the wild because only one plant is known to exist.

Our Response: Comments noted.

(10) *Comment:* One commenter noted that not all nursery stock of *Arctostaphylos franciscana* is of unknown origin. The commenter stated that UC

Berkeley Arboretum and Yerba Buena Nursery sell plants of known origin. Plants from Yerba Buena Nursery have been planted in Golden Gate Park Arboretum, which validates their legitimacy. The commenter further stated that specimens from verified sources are a vital repository and should not be disregarded.

Our Response: The UC Berkeley Botanical Garden does not sell *Arctostaphylos franciscana* plants; however, their stock was originally from the Laurel Hill Cemetery and may have been the source for plants sold by California Native Plant Society (Forbes 2012, p. 1). We agree that some *A. franciscana* plants in the nursery trade originated from plants salvaged from the Laurel Hill Cemetery prior to its destruction in 1947; however, it is difficult to trace the lineage of all nursery plants in the intervening 65 years. Some currently available, nursery-grown *A. franciscana* plants could be cultivars selected for specific growth characteristics, and others could be the product of hybrid seed. Plants from Yerba Buena Nursery that were planted at Golden Gate Park Arboretum, now known as the San Francisco Botanic Garden, are believed to be *A. franciscana* (D. Mahoney 2012, pers. comm.). We encourage the use of plants that are proven to be *A. franciscana* to generate stock for additional populations of *A. franciscana*. However, introgression (the spread of genes of one species into the gene pool of another by hybridization) could occur if hybrid nursery stock is outplanted near the wild plant and cross-fertilization occurs. Because of the uncertainty of the origin or subsequent hybridization, we currently only consider the plants of confirmed origin at East Bay Regional Parks Botanic Garden at Tilden Regional Park and at UC Botanical

Garden at Berkeley, and the wild plant on the Presidio to be *A. franciscana* and the listed entity.

(11) *Comment:* One commenter noted that there is no apparent incentive for anyone to poach or vandalize plants in natural settings that are available in the nursery trade.

Our Response: Plants have been vandalized in Golden Gate Park, including species that are also available in nurseries such as elm and sycamore trees, and rose bushes (King 2010, unpaginated; Gordon 2010, unpaginated). The fact that a plant is available in the nursery trade does not protect it from being vandalized or poached.

(12) *Comment:* A commenter noted that leaving the nursery trade specimens of *Arctostaphylos franciscana* unlisted may result in introgression. The commenter suggests that including nursery stock in the listed entity will help to regulate this threat.

Our Response: *Arctostaphylos franciscana* has been available to the public in the nursery trade for many years, and introgression of this species with other manzanitas may have already occurred. Including *A. franciscana* nursery stock as part of the listed entity will have no effect on controlling hybridization of these plants. Only the removal of *A. franciscana* from nursery production could minimize its hybridization with other species of *Arctostaphylos* while in the nursery setting.

(13) *Comment:* A commenter noted that if the *Arctostaphylos franciscana* plants in the nursery trade are not considered to be the listed species, they should be protected under the similarity of appearance provisions of the Act.

Our Response: We acknowledge that similarity of appearance is a tool available to us under the Act. Section 4(e) of the Act states that the Secretary may treat any species as an endangered species or threatened species even though it is not listed pursuant to section 4 of the Act if he finds that: (1) Such species so closely resembles in appearance, at the point in question, a species which has been listed that enforcement personnel would have substantial difficulty in attempting to differentiate between the listed and unlisted species; (2) the effect of this substantial difficulty is an additional threat to an endangered or threatened species; and (3) such treatment of an unlisted species will substantially facilitate the enforcement and further the policy of the Act. It should be noted, however, that the basic intent of section 4(e) of the Act is to prevent the inadvertent harm to the listed species in the wild resulting from its similarity to a different species that is not protected by the Act. The *Arctostaphylos franciscana* plants in the nursery trade do not need the protection of the Act, and including them in this listing under section 4(e) will provide no or minimal benefit to the wild specimen or any future outplantings of the listed entity. Similarity of appearance protections can be effective in situations where collection of a species is highly desirable (such as for insects or butterflies) and such collection is the primary threat or a threat of such an extent that not including the similar species with the listed entity would greatly affect the listed species' status. Although collection of the remaining wild plant and any future

outplantings is a potential threat, no known collection has occurred to date, and we would not consider this threat to be of such a high level as to greatly affect the species' status.

As a result, we have determined that treating *A. franciscana* plants in the nursery trade as endangered under section 4(e) of the Act would not substantially facilitate enforcement or the policy of the Act, and the Secretary is not invoking section 4(e) of the Act for *A. franciscana*.

(14) *Comment:* One commenter disagreed with information we reported, which indicated that lands in Area B of the Presidio, which are managed by the Presidio Trust, could be dispersed to the private sector and become available for development if the Presidio Trust is not financially self-sufficient by 2013. Further, the commenter does not agree that differences in the missions of the Presidio Trust and NPS would cause uncertainty in the future management of the *Arctostaphylos franciscana* and its habitat.

Our Response: The Presidio Trust Act of 1996 states in section 105(b) that the Presidio Trust must be self-sufficient within 15 complete fiscal years of the first meeting of the Presidio Board of Directors, thereby requiring that the Trust be self-sufficient by 2013 (Presidio Trust Act, p. 9; Presidio Trust Management Plan 2002, p. 1). Because this timeframe extends into the future, there is no assurance that this goal will be met. The Presidio Trust, as stated in the Presidio Trust Management Plan (2002, pp. 1, 12), is directed to preserve natural, scenic, cultural, and recreation resources, and at the same time ensure that the Presidio becomes financially self-sufficient. Again, as stated in the Presidio Trust Management Plan (2002, pp. 1, 12), "Congress gave the Trust the

authority to lease property and generate revenues, and required the Presidio to be financially self-sufficient by 2013. Once appropriations cease, the Trust must use the park's building assets to fund its rehabilitation and to pay for its ongoing operation. No other area within the National Park System is managed in the same way or operates under the same financial requirement.” The mission of NPS on the Presidio, as stated in the Golden Gate National Recreation Area Addition Act of 1992 (16 U.S.C. 460bb), while similar to the Presidio Trust Act in protecting values and resources, does not include the mandate that the public lands under NPS authority become financially self-sufficient.

(15) *Comment:* One commenter stated that there are no remaining landfill remediation sites on the Presidio that have the potential to impact *Arctostaphylos franciscana*, and that all waste material has been removed from the landfill remediation site closest to where the wild plant is located. The commenter noted that this work was completed without impacts to *A. franciscana* and asked that we delete the text under Factor A that refers to the Presidio Environmental Remediation Program.

Our Response: Remediation of the landfill site closest to the *Arctostaphylos franciscana* on the Presidio is being completed without apparent impact to the wild plant, and no further remediation projects are located within the vicinity of the plant. Remediation of this landfill site has been deleted as a current threat from the Factor A discussion.

(16) *Comment:* A commenter noted that under Factor E we stated that the *Arctostaphylos franciscana* plant is located near an area available for public events and threatened by foot traffic. The commenter stated that this area is available one afternoon per week for wedding ceremonies and does not present a threat to the plant, and requested that reference to this event space be removed as a threat.

Our Response: As stated in the proposed rule, the Presidio is a highly popular, easily accessible National Park contiguous with the City of San Francisco, which receives 5 million visitors each year. The public area described in the proposed rule, which is available for public events, provides views of the San Francisco Bay and the City of San Francisco, and attracts a large number of visitors year round. The best information available to us indicates that the public has unrestricted access to this area 24 hours a day, every day of the year; therefore, this site may be a different location than that referred to by the commenter. Additionally, the *Arctostaphylos franciscana* plant has been located near common-use trails with unrestricted access. Because of its proximity to these heavily used areas, the plant could be damaged accidentally or intentionally by park users. The Presidio Trust and NPS are concerned that authorized and unauthorized group tours by plant enthusiasts could overwhelm the plant and compact the soil (T. Thomas, pers. comm., 2011).

(17) *Comment:* One public commenter stated that designation of critical habitat is not prudent or determinable for the reasons stated in the proposed rule.

Our Response: As noted in our response to comment 2, the peer reviewers provided information on the ecological requirements of *Arctostaphylos franciscana* and areas with the highest potential for establishing new populations. Based on this information, we have determined that the designation of critical habitat is prudent and determinable. As a result, a proposed rule to designate critical habitat for *A. franciscana* is published in the Proposed Rules section of today's **Federal Register**. Please see that proposed rule for information on submitting a comment on our proposed designation of critical habitat for *A. franciscana*.

Summary of Changes from Proposed Rule

Based on peer review and public comments (see comments 1, 6, 7, and 15 in the **Summary of Comments and Recommendations** section above), and monitoring of the wild plant, we have added new information in the *Species Information* section and additional threats information in the **Summary of Factors Affecting the Species** section to better characterize our knowledge of the species' habitat requirements and threats. After input from peer reviewers and public comment, we have determined that the designation of critical habitat is prudent and determinable, and we are proposing to designate critical habitat, as described in a separate proposed critical habitat rule in today's **Federal Register**.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of these factors is discussed below.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range.

All areas of habitat originally known to be occupied by *Arctostaphylos franciscana* have been lost to urban development or to habitat conversion through the introduction of nonnative plant species (Chasse *et al.* 2009, pp. 4, 7; Chasse 2011c, p. 1). The largest historical occurrence was at the quarry area of the former Laurel Hill Cemetery in San Francisco (Chasse 2011c, p. 1). Most of this area was converted to residential housing and city streets after the late 1940s. A small remaining area of open space at Laurel Hill is dominated by ornamental shrubs and invasive understory plants, although serpentine rock is visible in several openings (Chasse 2011c, p. 1). Lawns, pathways, and buildings, part of the University of San Francisco campus, now occupy the

location of the Masonic Cemetery occurrence (Chasse 2011c, p. 2). The precise location of the third historical occurrence of *A. franciscana*, at Mount Davidson, is unknown but thought to be on one of the greenstone outcrops (Chasse 2011c, p. 2). The upper portions of Mount Davidson are covered with nonnative trees and invasive understory species; some grassland and scrub persist on the south and northeast sides (Chasse 2011c, p. 2). The species' range is now limited to the single transplanted location on the Presidio. In January 2010, after the newly discovered wild plant was moved to the Presidio, the plant's habitat at Doyle Drive was destroyed as part of a Caltrans highway improvement project.

Past urban development on the San Francisco peninsula has limited the remaining areas of potential habitat for *Arctostaphylos franciscana* by habitat conversion and habitat degradation and, to a lesser degree, habitat fragmentation. Some of these small remnant areas may no longer be suitable for reestablishment of *A. franciscana* due to factors such as dominance by other plant species (Chasse pers. comm., 2011). Currently, these small, isolated parcels are subject to edge effects, such as changes in soil moisture, changes in light, and potential increased invasion of weed species that would compete with *A. franciscana* for limited resources (water, nutrients, space).

Urban barriers, such as streets and buildings, have been found to impose a high degree of isolation on chaparral species and, over time, to result in decreased numbers of native plant species and concurrent increased numbers of nonnative plant species in the habitat fragments (Alberts *et al.* (unpubl.) as cited in Soule *et al.* 1992, p. 41; Soule *et al.*

1992, pp. 41–43). These effects of urbanization on the San Francisco peninsula are expected to continue to affect these remnant parcels into the future, and to pose a threat to the establishment of additional *Arctostaphylos franciscana* plants, without assistance to restore suitable habitat conditions and to restore plants to suitable locations.

Additionally, nitrogen deposition may modify habitat by increasing soil nutrients, thus posing a current and continuing threat to remnant habitat that might otherwise be suitable for *Arctostaphylos franciscana*. Weiss and Luth (2003, p. 1) have conducted research on the effects of nitrogen deposition in a serpentine grassland south of the San Franciscan peninsula. They found that nitrogen deposition from automobiles on Highway 280 (a north-south oriented highway on the peninsula) was responsible for higher nitrogen levels in the soil within 400 m (1,312 ft) on the west side and 100 m (328 ft) on the east side of the roadway. Nitrogen deposition was correlated with increased nonnative grass cover in these areas, resulting in competition for space for native plants. Native species within this zone are thought to be at long-term risk from invasions of nitrogen-loving grasses and other weedy plant species (Weiss and Luth 2003, p. 1). An increase in nonnative grass cover through changed habitat conditions could threaten the wild *A. franciscana* by competing for soil moisture and nutrients and could inhibit successful germination of *A. franciscana* seed. The entire northern San Francisco peninsula, with the exception of the Presidio and Golden Gate Park, has been urbanized, and four major highways (Highways 1, 101, 280, and 480) and other urban roadways dissect the peninsula. Urban areas and roadways are a continuous source of nitrogen deposition from automobiles, trucks, and industrial and home heating (Weiss 1999, p.

1477). Invasions of nitrogen-loving plants into nitrogen-limited grasslands and shrublands appears to be a common response to atmospheric nitrogen deposition (Weiss and Luth 2003, p. 1), and may partly explain why the ecosystem that existed on the San Francisco peninsula has been so altered.

The one remaining wild *Arctostaphylos franciscana* plant is subject to multiple threats. The Presidio Trust Act contains a sunset clause that could result in the transfer of Presidio holdings to the General Services Administration (GSA) for disbursement if the Presidio Trust operations are not self-sufficient by 2013 (the Presidio Trust Act is discussed under *Factor D* below). In the unlikely event that the Presidio Trust is not self-sufficient within that timeframe, the potential that lands could be transferred and become available for development presents a threat of additional habitat loss in the future.

Based on the best scientific and commercial information available, we consider the present or threatened destruction, modification, or curtailment of the species' habitat or range to be a high-magnitude and ongoing threat to the wild population of *Arctostaphylos franciscana*. The current fragmented and degraded condition of most remaining serpentine or greenstone soil habitat on the San Francisco peninsula threatens the ability of *Arctostaphylos franciscana* to expand its range. The threats of possible development and change in management of the habitat may further limit the species' propagation and expansion, and could potentially threaten the only remaining wild plant. The loss of the plant's native serpentine chaparral habitat to development and the

curtailment of its range restrict the species' current and future ability to naturally reproduce and expand its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.

Overutilization of *Arctostaphylos franciscana* is possible due to its popularity for landscape use, as evidenced by the widespread use of cultivars of this species in the commercial nursery trade. *Arctostaphylos franciscana* is specifically recommended for use in erosion control on steep slopes (Theodore Payne Foundation 2009, p. 1; Sierra Club 2011, p. 1).

The attention and media coverage generated by the discovery of a species thought to be extirpated from the wild may result in efforts by the public to visit the plant and possibly collect cuttings or seed. Although the location of the transplanted plant has not been disclosed, it was planted in a heavily used area in the Presidio, near common-use trails with unrestricted access by the public. The Presidio is a National Park and is part of the GGNRA; it is open to the public 24 hours a day, every day of the week and receives 5 million visitors annually. The Presidio receives heavy use because of its proximity to the City of San Francisco, and because the National Park has no entrance fees and contains restaurants, trails, and businesses that can be accessed by car, foot, or public transport. The Presidio Trust and NPS are making serious efforts to avoid disclosing the location of the translocated plant. The Presidio Trust and NPS are concerned that public knowledge

of the plant's location would lead to authorized and unauthorized group tours by plant enthusiasts (T. Thomas, pers. comm., 2011).

No damage to the plant has been observed to date; however, trampling or the taking of cuttings could occur if the identification and location of the plant becomes known. Similarly, another extremely rare plant, *Arctostaphylos montana* ssp. *ravenii*, is also located on the Presidio. Although it was federally listed in 1979, its location has not been revealed to the public by the Presidio Trust or NPS in order to protect the plant from vandalism. There has been no evidence of cuttings being taken from *A. franciscana* or the similar *A. montana* ssp. *ravenii* (Chasse 2011c, p. 3); however, the fact that the sole remaining wild *A. franciscana* is located in a heavily used public area subjects this species to the threat of collection.

Based on the best scientific and commercial information available, we consider overutilization for commercial and recreational purposes to be a threat to the wild *Arctostaphylos franciscana* plant. Although nursery-grown *A. franciscana* are available to residents for use in private gardens, collection of the wild plant is a threat to the species, and we expect it may be a threat in the future, particularly if the location of the plant becomes known to the public.

C. Disease or Predation.

Disease

Transplantation of the single wild *Arctostaphylos franciscana* plant may have caused stress to the plant, and thereby made it more susceptible to predation and disease. In transplanted plants, stress and root damage may occur from a variety of factors, including soil compaction from foot traffic around the plant (Hammitt and Cole 1998, p. 52), too little or too much water, and improper planting depth; these stressors may result in increased susceptibility to disease (see further discussion in Visitor Use section below). A fungal infection called twig blight, usually caused by *Botryosphaeria* species in *Arctostaphylos*, is also a potential concern, particularly during wet years (Service 2003, p. 69). Twig blight was observed in the wild plant during the winter of 2009–2010, but it subsided during the dry summer months (Chasse 2010, p. 2). These fungi can cause both twig blighting and perennial branch cankers that can eventually kill large branches (Swiecki 2011, p. 1). While these pathogens would not likely pose a serious threat to a large population, they could threaten *A. franciscana* because the wild population is limited to a single plant, and infection by this group of fungi is one of the major factors leading to the decline of older *Arctostaphylos* sp. plants (Swiecki 2011, p. 1). Additionally, cankers caused by *Botryosphaeria* are more severe in plants that are stressed by lack of water. The transplanted plant may have experienced water stress due to loss of roots during the transplanting process (Swiecki 2011, p. 1).

Arctostaphylos franciscana is also threatened by various pathogens in the genus *Phytophthora*. An oak tree infected with sudden oak death disease was discovered on the Presidio in 2010 (Fimrite 2011). Sudden oak death is caused by *Phytophthora ramorum*.

Phytophthora is a fungus-like organism most closely related to diatoms and kelp (Kingdom Stramenopila) rather than to the true fungi (Kingdom Fungi or Eumycota). *Phytophthora ramorum* has so far been observed to cause only a foliar blight in species of *Arctostaphylos*, rather than the lethal bark cankers that occur on members of the black oak group (Swiecki 2012a, p. 1). However, a related species, *P. cinnamomi* has presented a serious threat to other *Arctostaphylos* species and is expected to be a serious threat to *A. franciscana*. *Phytophthora cinnamomi*, a soil-borne pathogen, has long been known as a world-wide threat to commercial and ornamental plants. It is an introduced exotic pathogen in North America; its native range is unknown, but is suspected to be southeast Asia. Human-related activities, including the international plant trade, have facilitated the spread of *P. cinnamomi* into many habitats worldwide (Swiecki *et al.* in press, p. 3). *Phytophthora cinnamomi* was introduced to California early in the 20th century, and recently has been identified as a serious threat to the State's native plants and their habitats (Swiecki *et al.* in press, p. 3).

Phytophthora cinnamomi has been the cause of the decline and death of rare *Arctostaphylos* species, including the federally threatened *A. pallida* (pallid manzanita) in the Oakland Hills of the East San Francisco Bay region and the federally threatened *A. myrtifolia* (lone manzanita) near Lone in the Sierra Nevada foothills of Amador County. The pathogen is also noted in the decline of other woody native species in the San Francisco Bay area (Swiecki *et al.* in press, pp. 3–5). The organism causes root decay but can also kill above-ground portions of some plants (Swiecki *et al.* in press, p. 3). *Phytophthora cinnamomi* is persistent in soil, and once introduced to native habitat it

cannot be eradicated (Swiecki *et al.* in press, p. 3). *Phytophthora cinnamomi* is transmitted by contaminated shoes, tools, and infested soil clinging to tires, and by contaminated nursery stock, including native plant stock. Many areas showing plant mortality caused by *P. cinnamomi* are associated with hiking trails, landscapes with ornamental plants, and, in one case at the Apricum Hill Preserve in Amador County, California, use by visitors, including researchers, agency personnel, students, and the general public (Swiecki *et al.* in press, p. 4).

Phytophthora cinnamomi poses a significant current and future threat to *Arctostaphylos franciscana* because of the potential for infestation caused by the public and staff who regularly work with the plant. It is not possible to predict if or when the pathogen might infect the wild plant because the disease is generally transmitted directly or indirectly by humans or human activity. The pathogen could be introduced from soil on contaminated shoes and tools, or from cuttings of *A. franciscana* plants currently grown in a number of San Francisco Bay area nurseries that could become contaminated. Swiecki *et al.* (in press, p. 6) tested *A. menziesii* plants purchased from four nurseries and found them to be infested with four *Phytophthora* species that cause root infections or stem cankers, including *P. cinnamomi*. Crown rot, which is caused by *P. cinnamomi*, is known to occur in *A. myrtifolia* and *A. viscida* (Swiecki *et al.* in press, p. 3), and is a concern when outplanting nursery-grown plants to wild locations (Chasse *et al.* 2009, p. 17). However, crown rot has not been observed in the wild *A. franciscana* plant (Chasse 2010, p. 2).

Conservation proposals include recommendations that *Arctostaphylos franciscana* cuttings be planted with the transplanted *A. franciscana* to facilitate cross-pollination of the different genotypes. Should the wild plant become contaminated with *P. cinnamomi*, the result would be the decline and death of the wild plant and permanent contamination of the soil and seedbank beneath the plant. Any seedlings that germinate from this seedbank would also very likely be contaminated and not survive. Any cuttings that become contaminated are also expected to die of the pathogen. The Golden Gate National Parks Conservancy Nurseries staff in charge of propagation and care of *A. franciscana* cuttings are aware of the threat of contamination and rigorously follow clean procedures to prevent infection to the cuttings or the wild plant; however, a risk of contamination continues to exist because current fungicides do not eradicate 100 percent of *Phytophthora* spores (Young 2010b, p. 1). The cuttings and layers from the single wild plant have been dispersed to seven different locations and growers, which, while decreasing the risk of complete loss of plant material, also increases the risk of exposure to disease.

Phytophthora cinnamomi is not the only introduced soil-borne *Phytophthora* species that may threaten *Arctostaphylos franciscana*. Swiecki (2011, p. 1; 2012b, p. 1) notes that at least five other species of *Phytophthora* associated with the decline and death of woody plants have been found in the Crystal Springs watershed 27 to 40 kilometers (km) (17 to 25 miles (mi)) south of the Presidio. These nonnative *Phytophthora* species include *P. cambivora*, *P. cactorum*, and *P. megasperma*; all are known to occur in natural and cultivated landscapes and are common in nursery stock

(Swiecki 2011, p. 1). *Phytophthora cinnamomi* and *P. cambivora* have been detected in China Camp State Park, 22.4 km (14 mi) north of the Presidio, and *P. cinnamomi* has been found in the East Bay area 24 km (15 mi) east of the Presidio. Because several of these soil-borne pathogens have become established in the San Francisco Bay area, the likelihood is increased that one or more could be introduced to the vicinity of the wild *Arctostaphylos franciscana* plant (Swiecki 2011, p. 1).

Predation

After being transplanted, the wild plant became severely infested with the larvae of a native leaf roller moth (*Argyrotaenia franciscana*) (Estelle 2010, p. 1). Treatment for the infestation was hand removal of the larvae and all infected leaves, which resulted in the removal of some of the new growth on the plant (Estelle 2010, p. 1; Young 2010a, p. 1). A parasitic wasp emerged from one captured leaf roller moth larva, indicating that the moth has natural enemies (Frey 2010, p. 2). The moth has not been known to kill plants and does not appear to be a serious threat at this time; however, the moth species was found to have five overlapping generations in a year (Estelle 2010, p. 1). Monthly removal of moth larvae and pupae is conducted as needed (Estelle 2012a, p. 1). The leaf roller moth infestation in early 2010 did not permanently damage the plant, and new growth was observed (Frey 2010, p. 2). Fewer leaf roller moth larvae were seen on the wild plant in 2011 than in 2010 (Estelle 2012a, p. 1).

Damage to *Arctostaphylos franciscana* branches by California voles has been observed by Presidio Trust staff (Chasse 2011c, p. 2). Several voles have been observed in and around the wild *A. franciscana* plant, and some branch dieback has been attributed to gnawing by voles and other rodents (Chasse 2011c, p. 2).

Based on the best scientific and commercial information available we consider the effects from disease and predation to be a threat to *Arctostaphylos franciscana*. Infection of the plant by *Phytophthora cinnamomi* or other *Phytophthora* species has been determined to be a serious threat to *A. franciscana* because only one plant occurs in the wild, the disease is easily and quickly spread by multiple vectors, and at least six species of *Phytophthora* are known to be present in the vicinity of the San Francisco peninsula. Additionally, we consider predation to be a relatively minor but ongoing threat to the wild population of the species. Although the leaf roller moth has not been known to kill *Arctostaphylos* species, the moth produces five overlapping generations per year and severely damaged the leaves in 2010. Predation on branches by California voles has occurred and is also relatively minor but ongoing threat.

D. The Inadequacy of Existing Regulatory Mechanisms.

Regulatory mechanisms protecting *Arctostaphylos franciscana* derive primarily from the location of the single known wild plant on GGNRA lands on the Presidio, which are administered by the Presidio Trust. The Presidio Trust was established by the Presidio Trust Act of 1996 to manage the leasing, maintenance, rehabilitation, repair, and

improvement of property within the Presidio (Presidio Trust Act, as amended, sec. 104 (a)). The Presidio Trust is directed to preserve the natural, scenic, cultural, and recreational resources on the Presidio, but also is directed to ensure that the Presidio becomes financially self-sufficient by 2013 (Presidio Trust 2002, pp. 1, 2, 12). The Presidio Trust Act directed that the Presidio Trust design a management program to reduce NPS expenditures and increase revenues to the Federal Government to the maximum extent possible (Presidio Trust Act, pp. 5, 6). The Presidio Trust Management Plan was published in May 2002. The Presidio Trust manages most of the Presidio (Area B), and NPS retains jurisdiction over Area A as defined in the Presidio Trust Management Plan (Presidio Trust 2001, p. 3). The Presidio Trust and NPS coauthored the Presidio Vegetation Management Plan. For special status plants, the plan provides an objective to preserve and enhance rare plant habitats by evaluating species-specific habitat needs, giving high priority to actions that preserve and enhance those habitats (Presidio Trust 2001, Chapter 3, unpaginated).

Federal regulations for the Presidio Trust, which offer some protection to *Arctostaphylos franciscana*, include prohibitions on disturbing, injuring, removing, possessing, digging, defacing, or destroying from its natural state, any plant or parts thereof. Unauthorized introduction of plants and plant seeds is also prohibited, offering limited protection against invasive, nonnative species. Additional regulations require that special events be permitted by the Presidio Trust, and provide for restricting visitor use to address resource conflicts (36 CFR 1002).

The Presidio Trust is a new model for National Park management in that the Presidio Trust is directed to preserve the natural, scenic, cultural, and recreational resources on the Presidio and at the same time ensure that the Presidio becomes financially self-sufficient by 2013 (Presidio Trust 2002, pp. 1, 12). This means that generation of revenue is a consideration for the Presidio Trust's activities, as well as resource protection. The cost of operation and care are higher for this park than for most National Parks because of the Presidio's large number of structures and cultivated landscapes (Presidio Trust 2011, unpaginated). The mission of NPS on the Presidio, as stated in the Golden Gate National Recreation Area Addition Act of 1992 (16 U.S.C. 460bb), although similar to the Presidio Trust Act regarding the protection of natural, historic, scenic, and recreational values, does not include the mandate to ensure that the Presidio becomes financially self-sufficient.

The future status of the Presidio as National Park land is uncertain, as explained in the Presidio Trust Act's section 104(o) (Reversion), which states: "If, at the expiration of 15 years, the Trust has not accomplished the goals and objectives of the plan required in section 105(b) of [the Presidio Trust Act], then all property under the administrative jurisdiction of the Trust pursuant to section 103(b) of [the Presidio Trust Act] shall be transferred to the Administrator of the General Services Administration to be disposed of in accordance with the procedures outlined in the Defense Authorization Act of 1990 (104 Stat. 1809), and any real property so transferred shall be deleted from the boundary of the Golden Gate National Recreation Area. In the event of such transfer, the terms and conditions of all agreements and loans regarding such lands and facilities entered into by

the Trust shall be binding on any successor in interest.” This clause indicates that lands currently considered National Parks lands could be disbursed to the private sector and subject to development within the near future. The Presidio Trust states, however, that since 2004, the Trust’s earned revenue has offset operating costs and expects that the Presidio will meet the goal of being a self-sustaining National Park in 2012 (Middleton 2011, p. 2).

Arctostaphylos franciscana is not listed under the California Endangered Species Act. The conservation plan and MOA are not regulatory in nature and not legally enforceable by third parties (Caltrans 2009, p. 8; Chasse *et al.* 2009, p. 3), limiting their usefulness in enforcing protections for the plant. Although general protections are provided for plants on National Parks, no regulatory language in any Park Service or Presidio Trust documents specifically addresses protection of *A. franciscana*.

Based on the best scientific and commercial information available, we consider the inadequacy of existing regulatory mechanisms not to be a threat to the species.

E. Other Natural or Manmade Factors Affecting Its Continued Existence.

Potential threats to *Arctostaphylos franciscana* include changes in environmental conditions resulting from climate change, trampling or disturbance by people visiting the Presidio, altered fire regime, loss of genetic diversity, loss of pollinators, and stochastic (chance) events.

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms “climate” and “climate change” are defined by the Intergovernmental Panel on Climate Change (IPCC). “Climate” refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term “climate change” thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Changes in environmental conditions resulting from climate change may cause presently suitable habitat to become unsuitable for endemic California plants, due to projected changes in temperature and rainfall (Loarie *et al.* 2008, pp. 1–2). A U.S. Geological Survey (USGS) study in National Park lands in northern California and

Oregon is underway to examine trends in climate, ocean conditions, and other features (Madej *et al.* 2010, p. 7). In these National Park lands, variation in abiotic factors (for example, precipitation, fog, and air and ocean temperatures) regulates many ecological processes, including the distribution of vegetation and frequency of disturbance from fires, floods, landslides, and pest species. The preliminary results of the USGS study show an increase in average maximum summer air temperatures at GGNRA, near the Presidio (Madej *et al.* 2010, p. 24).

Summer fog and overcast along the California coast has been identified as ecologically important to endemic plant species by increasing water availability during the dry summer months, reducing loss of water from leaves (evapotranspiration), and decreasing the frequency of drought stress (Fischer *et al.* 2009, pp. 792–794). Fog frequency along the Pacific coast is highest in north and central California and declines in Oregon and southern California (Johnstone and Dawson 2010, p. 4534). Climate change may be affecting the amount and duration of fog and cloud cover along the California coast including within the San Francisco Bay area. Mean fog frequency in the California region, quantified by cloud ceiling height measured at airports, has decreased since 1951 (Johnstone and Dawson 2010, p. 4535). Research by Vasey (2010, p. 1) suggests that most coastal endemic *Arctostaphylos* species are more vulnerable to drought stress than those found in interior California, and could be threatened by a decrease in coastal summer fog. He found that obligate-seeding *Arctostaphylos* species, such as *A. franciscana*, are better hydrated in areas that receive fog. He also found that coastal obligate-seeding species are more vulnerable to vascular cavitation (blockage forming in

water vessels in the plant) when the rate of water loss through the leaves becomes too great, such as during drought (Vasey 2010, p. 1). This disruption of water flow can lead to branch death and possibly death of the entire plant (Vasey 2010, p. 1).

Reduced soil moisture from decrease in summer fog may also result in reduced seed germination and seedling survival. Additionally, the ability of *Arctostaphylos franciscana* to respond to future climate changes by establishing new plants in new habitat may be limited because of the plant's association with serpentine and greenstone bedrock outcrops (Service 2003, pp. 95, 96), and because soils derived from serpentine and greenstone bedrock on the peninsula are limited in area and largely fragmented (Chasse 2010, p. 1). Natural movement of the species by seed dispersal to reach cooler, moister areas to the north would be impeded by barriers such as the San Francisco Bay.

Increased temperatures within *Arctostaphylos franciscana* habitat could also result in higher soil temperatures that would favor *Phytophthora cinnamomi*, which reproduces best at warmer soil temperatures. Higher temperatures would also increase the likelihood of water stress on *A. franciscana*, increasing its susceptibility to other *Phytophthora* species (Swiecki 2011, p. 1).

Alteration of the Natural Fire Regime

In addition to soil type and climate, fire plays a critical role in the determination of plant distribution (Keeley 2007, p. 19). The chaparral plant community, of which

Arctostaphylos is an important member, is adapted to specific fire regimes that vary in different parts of California. In the San Francisco East Bay region, the current fire return interval is estimated at about 100 years (Keeley 2007, p. 20). Factors that affect the fire frequency in the San Francisco Bay area include a short fire season, moist climate, the local human population density, and changes in human behavior. Due to prevailing ocean winds and frequent fogs, the average relative humidity along the coast is moderate to high throughout the year. The exceptions typically occur in the fall, when changing prevailing weather patterns allow dry northeasterly winds from the State's interior to reduce humidity in the coastal area to around 20 percent, thereby creating dry and windy conditions that typify high fire danger (GGNRA 2005, pp. 136, 140).

Fire frequency in the San Francisco Bay area has varied substantially in the last several thousand years. Not only have the fire regimes changed with changing climate, fire regimes have changed as patterns of human utilization of the landscape have changed. Disturbances by fire occurred at long intervals in the prehuman period, then at shorter intervals during the late Native American and Spanish-Mexican periods, and at moderate intervals during the European settlement period. Fire disturbance intervals since the 1900s have generally returned to long intervals in the modern period due to active fire suppression (GGNRA 2005, pp. 144–147). The natural fire regime has been heavily altered by the urbanization of San Francisco and fragmentation of remaining undeveloped lands. Nearly all land within the City of San Francisco has been developed, with the exception of small, isolated parcels and undeveloped hilltops. Lands administered by NPS and the Presidio Trust are surrounded by other land uses, and are

close to the wildland-urban boundary where landscape plants and nonnative plants contribute to vegetative buildup (GGNRA 2005, pp. 130–131) that can increase fire danger. Additionally, fire suppression over the last 100 years has led to an increase in crown and surface fuels, which contribute to high-intensity fires (GGNRA 2005, p. 147). In spite of the increased fire danger on these managed lands, they could eventually be identified as suitable for outplanting *Arctostaphylos franciscana* seedlings due to the limited amount of remaining habitat.

As stated above in the *Species Information* section above, *Arctostaphylos franciscana* is an obligate-seeding species and reproduces primarily from seed rather than from burls after a fire (Vasey 2010, p. 1). Two opposing types of changes in fire frequency can threaten chaparral species such as *Arctostaphylos franciscana*. First, “senescence risk” occurs when too little fire leads to the loss of a species dependent on fire for regeneration. The second, “immaturity risk,” is a threat primarily to obligate-seeding species such as *A. franciscana*. In this case, wildfires that occur too frequently may kill plants before they can reach reproductive maturity and produce seed (Keeley 2007, p. 18). Wildfire can substantially reduce the number of live seeds in the soil (Odion and Tyler 2002, p. 1). Odion and Tyler (2002 p. 1) found that a controlled burn in a 40-year-old stand of *A. morroensis* (Morro manzanita), a species also occurring in maritime chaparral, reduced the seedbank to 33 percent of that which had accumulated in the soil since the previous burn 40 years earlier. Three years after the burn, the new population of *A. morroensis* that had germinated from the seedbank was less than half the size of the original population (Odion and Tyler 2002, p. 1). Odion and Tyler (2002 p. 2)

concluded that if viable seed densities in the soil are low because fires are too frequent to allow seeds to accumulate in the soil, the population may risk extinction.

The fire return interval for this general area, and, therefore, for *Arctostaphylos franciscana*, is currently approximately 100 to 125 years (Parker pers. comm., 2011; Vasey 2011a, p. 1). The long fire return interval is not thought to be a threat to the mature *A. franciscana* plant at the Presidio or to any seedlings likely to be outplanted on the Presidio in the future. Infrequent fire would allow the mature plant at the Presidio to produce seed and build up a sufficiently large seedbank to withstand seed loss from wildfire, and would allow the growth of outplantings in other suitable areas. However, if fire continues to be excluded from the plant's location at the Presidio and the fire return interval greatly exceeds the natural return interval, over time the loss of fire may also result in the loss of the mature plant and individual outplanted seedlings due to competition by other plants, including nonnative plants, that could encroach upon the manzanita.

Other aspects of the altered fire regime within the remaining undeveloped lands of San Francisco pose greater threats to the species. Alteration of the fire regime has led to an increase in crown and surface fuels in some areas, leading NPS fire planners to conclude that it is difficult to predict the effects of the changed fire regime, given the trend to warmer and drier climate conditions (Johnstone and Dawson, 2010, p. 4535; Madej *et al.* 2010, p. 24) and the relationship between climate and fire frequency (GGNRA 2005, pp. 147, 148). In the past, large fires have occurred within areas that are

typically subject to maritime climatic conditions. Such fires include the 1923 Berkeley Fire, the October 1991 Oakland Fire (Keeley 2005, p. 286) that burned 607 ha (1,500 ac), the October 1995 fire at Point Reyes National Seashore that burned 4,999 ha (12,354 ac) (GGNRA 2005, p. 151), and the 1,133-ha (2,800-ac) 2009 Lockheed Fire north of the City of Santa Cruz (The Associated Press 2009). On the Presidio, fire history data show that 17 fires occurred between 2000 and 2009, with no fires in some years and as many as 5 fires in other years. All fires were contained at 0.04 ha (0.1 ac) or less (A. Forrestel, pers. comm., 2011a, 2011b). In the same period, approximately four wildfires occurred in the Marin Headlands, directly north of the Presidio across the Golden Gate, while recent fire history records for all areas of the GGNRA show the potential for larger wildfires in the maritime zone (GGNRA 2005, pp. 150–155).

Although the Presidio is located within a highly urbanized setting, substantial areas of open space within the Presidio itself and within the adjacent GGNRA lands contain an interspersed mixture of vegetative types, including native vegetation, landscaped grounds, and forest (GGNRA 2005, pp. 190–199; Presidio Trust 2011, unpaginated). Grasslands are now dominated by nonnative annual grasses and forbs, which burn with greater intensity and at a more rapid rate of spread than grasslands dominated by native species (GGNRA 2005, p. 192). According to a fire model prepared by the GGNRA, areas that they manage on the western and southwestern borders of Presidio Trust lands present a moderate and moderate-high fire hazard (GGNRA 2005, p. E-7). The altered fire regime may result in infrequent fires that burn larger and hotter than previously, with the potential for greater loss of the seedbank. Alternatively, the

incidence of wildfire could increase, which would be detrimental to *Arctostaphylos franciscana* by killing mature plants, seedlings, and seeds in the seedbank. In obligate-seeding species, such as *A. franciscana*, fire normally kills the adult plants, which are then replaced by plants that germinate from seed in the soil seedbank. A wildfire that would kill the single wild *A. franciscana* plant would be an especially serious threat to the future of the species because no *A. franciscana* seedbank has been found in soil collected from the area beneath the wild plant (Young 2011, p. 1).

Visitor Use

Impacts due to visitor use could harm the wild plant. The translocated wild plant has been planted in an active native plant management area that receives heavy public use, although it is protected from public access by a post and cable fence and is monitored (Chasse *et al.* 2009, pp. 20–28). The post and cable fence is placed along an adjacent trail so that people do not enter the immediate area around the plant; however, an event in which a visitor treads on the plant could result in damage to the wild plant. Over time, incremental damage could result in the decline of the plant. The fence appears to be effective, although its wire mesh has been bent either by employees and volunteers or by the general public crossing the fence (Estelle 2012b, p. 2). Presidio Trust staff has stated that, on a few occasions, volunteers and members of the general public have asked permission to visit and photograph the plant, and that volunteers who work with the plant have been requested to not disclose its location (Estelle 2012c, p. 1). As noted under *Factor B*, the Presidio Trust and NPS have made serious efforts not to

reveal the location of *Arctostaphylos franciscana* because they are concerned that public knowledge of its location would attract large numbers of plant enthusiasts who may damage the *A. franciscana* and compact the soil (Thomas, pers. comm., 2011). If trampling of the *A. franciscana* occurs, the Presidio Trust could take three protective actions: a fence could be placed around the plant, interpretive signs could be placed near the plant, and volunteers or interns could be made available to talk to visitors (Thomas, pers. comm., 2012).

The wild *Arctostaphylos franciscana* plant may be susceptible to damage from soil compaction due to foot traffic. Roots grow into soil to maintain stability and extract water and nutrients; however, soil compaction increases the resistance of the soil to root penetration and thus diminishes the plant's ability to extract sufficient water and nutrients (Hammitt and Cole 1998, p. 52). Soil compaction also reduces water infiltration rates and soil aeration by collapsing the larger pores in the soil. Reduced soil oxygen levels from loss of soil pores also can impact root growth, which would further reduce water and nutrient uptake (Hammitt and Cole 1998, p. 52). Additionally, soil compaction has been found to cause considerable damage to mycorrhizal fungi in seedling roots (Waltert *et al.* 2002, p. 1). As noted in the Historical Distribution and Habitat section, most *Arctostaphylos* species form strong symbiotic associations with soil mycorrhizal fungi, which develop an external sheath surrounding the plant's roots. All water and nutrients pass through this sheath to the plant's roots rather than directly from the soil to the plant's roots (Chasse 2009, p. 12). Damage from soil compaction would not only impact the

wild plant by reducing its ability to take up water and nutrients, but could also reduce the survival of seedlings near the wild plant.

Soil compaction also favors the growth of *Phytophthora*. Poor drainage resulting from compaction facilitates the dispersal of swimming zoospores that infect the host plant (Swiecki 2011, p. 2). Additionally, anaerobic (lack of oxygen) stress associated with saturated soil conditions increases the susceptibility of roots to *Phytophthora* infections (Swiecki 2011, p. 2).

Vandalism

The location of the *Arctostaphylos franciscana* plant within the Presidio is near common-use trails and an area available for private and public events. Threats to *A. franciscana* include damage from vandalism. Vandalism to trees was reported in the Presidio in the early 2000s (Thomas pers. comm. 2011). Severe vandalism was observed in Golden Gate Park, located approximately 1.5 mi (2.4 km) south of the Presidio, in summer 2010, when more than 40 trees and 30 rose bushes were destroyed by unknown persons for unknown reasons (Gordon 2010, unpaginated; King 2010, unpaginated). The post and cable fence that protects the wild *A. franciscana* plant is approximately 30 ft (9.1 m) from the plant and is not constructed to completely exclude visitors. In the unlikely event that vandalism occurs, the results could be serious because there is only one wild plant.

Stochastic Events and Small Population Size

Chance events constitute a serious threat to *Arctostaphylos franciscana*. Because the known population of *A. franciscana* in the wild is currently limited to a single plant, the species is extremely vulnerable to stochastic events—normal but damaging environmental perturbations and catastrophes such as droughts, storm damage, disease outbreaks, and fires, from which large, wide-ranging populations can generally recover, but which may lead to extirpation of small, isolated populations (Gilpin and Soule 1986, pp. 25–31). The majority of the remaining habitat associated with *A. franciscana* occurs within rock outcrops on hilltops or slopes surrounded by development or along coastal cliffs. These areas, because of their limited size and proximity to developed areas, are more likely to experience inadvertent fire or environmental degradation (altered hydrologic regime; increased introduction of nonnative, invasive plants; and increased spread of disease). The nature of the habitat associated with *A. franciscana* (rock outcrops, thin soils, sloped or hilltop terrain) may also increase the effects of drought. By nature these habitats generally do not have the water-holding capacity of deeper soiled, level habitats. Because some of the remaining habitat associated with the species is along coastal bluffs or on hillsides, these areas may also be more susceptible to landslides or erosion during excessively wet precipitation events. As a result, we consider stochastic events to be of significant threat for this species.

Any new population that starts from the single wild plant is likely to have reduced genetic variation compared to historical populations. Even if the number of plants

increases, it may not reverse the previous genetic loss, known as the bottleneck effect (Allendorf and Luikart 2007, p. 158). Bottlenecks generally have a greater and more lasting effect on the loss of genetic variation in species with slow growth rates (long-lived species with few offspring) (Allendorf and Luikart 2007, p. 133). The age of the single wild *Arctostaphylos franciscana* plant is estimated at 60 years, and no other *A. franciscana* plants or seedlings were found associated with the wild plant. Reduced genetic variation may result in the inability of future generations of the plant to adapt to changes in habitat, such as decrease in fog and increase in temperature (see Climate Change discussion above) or loss of pollinators (see discussion below). While *Arctostaphylos franciscana* may be capable of self-pollination, in general, self-pollination results in decreased genetic variation in the offspring of a plant (Allendorf and Luikart 2007, p. 123). Therefore, loss of genetic variation is expected if *A. franciscana* is dependent on self-pollination to produce seed. Based on the above discussion, we have determined that the loss of genetic variation is a significant threat for this species.

The wild plant is also threatened by the Allee effect, a decline in population growth rate due to declining plant density (Akçakaya *et al.* 1999, p. 86). For the wild *Arctostaphylos franciscana* plant, the Allee effect may result from a lack of other available *A. franciscana* plants with which to cross-pollinate and produce viable seed. The wild plant, the single remaining individual of its species in the wild, is currently dependent on its ability to self-pollinate, which may be limited, and the efforts of researchers and Presidio staff to provide additional plants of different genotypes (if they

are proven to be *A. franciscana*) from botanical garden specimens to cross-pollinate with the wild plant to produce new individuals and populations.

Loss of Pollinators

Suitable pollinators may be critical for seed production for this obligate-seeding species. If pollinators are absent, or present in insufficient numbers, there may be a lack of viable seeds to develop and maintain the seedbank. In a study of the effects of habitat fragmentation on a non-self-pollinating plant (Lennartsson 2002, pp. 3065, 3066, 3068), the author found that fragmented populations exhibited dramatically reduced seed set and population viability, both of which were caused by a reduction in the number of pollinators.

Pollinators have been observed on the wild *A. franciscana* plant; however, no surveys have been completed to identify the most important pollinators. The most frequent pollinators seen have been bees and bumblebees. Hummingbirds and butterflies have also been observed visiting the flowers, likely because few other plants are blooming during the winter months when *A. franciscana* blooms (Vasey, pers. comm. 2010). Although the loss of seed produced in a single year would not likely lead to the extirpation of the species, the continued reduction of the seed crop or dependence on self-pollination would reduce the seedbank, genetic variation, and the potential for population expansion.

Hybridization

Cultivars of *Arctostaphylos franciscana* are used in the commercial nursery trade. The cultivars (varieties of a plant produced and maintained by cultivation) are likely descended from some of the last wild *A. franciscana* plants known to exist in the 1940s, and are located in at least four botanical gardens (Chasse *et al.* 2009, pp. 7, 8). Because hybridization between diploid species of *Arctostaphylos* is well recognized (Chasse *et al.* 2009, p. 5), there is a good chance that many of these commercially available specimens have resulted from hybrid seed. Because of the threat of cross-pollination from hybrids or other species (Allendorf *et al.* 2001, pp. 613, 618–621), any propagation or reintroduction programs for *A. franciscana* must account for subsequent contamination of the *A. franciscana* gene pool. The conservation plan takes this into account by recommending that future outplantings of nursery-raised cuttings or seedlings of the recently discovered *A. franciscana* plant avoid areas that could facilitate cross-pollination (Chasse *et al.* 2009, p. 31). Appropriate outplanting areas will be determined by *A. franciscana* experts, in cooperation with NPS, the Presidio Trust, and the Golden Gate National Parks Conservancy (Chasse *et al.* 2009, p. 31). Although cross-pollination of the wild plant with hybrids and the production of hybrid seed is possible, we do not know if this is a substantial threat to the species.

Based on the best scientific and commercial information available, we consider that *Arctostaphylos franciscana* is negatively impacted by other natural or manmade factors affecting its continued existence which include changes in environmental

conditions resulting from climate change, altered fire regime, soil compaction from visitor use, vandalism, loss of genetic diversity, loss of pollinators, stochastic events, effects of small population size, and hybridization. Cumulatively, we consider these threats to be significant and ongoing.

Cumulative Impacts

Some of the threats discussed in this finding could work with one another to cumulatively create situations that potentially impact *Arctostaphylos franciscana* beyond the scope of the individual threats we have already analyzed. In particular, climate change may exacerbate many of the threats discussed in this final rule. For example, warmer, drier conditions in the range of the species could result in not only less summer fog and increased water stress leading to plant death, but could also create more suitable conditions for infection by *Phytophthora* species and result in more fires. The loss of native habitat due to urban development within the range of *A. franciscana* has likely reduced pollinator nesting areas and numbers of native plants that provide nectar and pollen. Climate change could increase the loss of pollinators if the abundance of flowers preferred by pollinators decreases and the synchrony of bloom periods and pollinator emergence is disrupted. Although there currently are no data available regarding changes in plant bloom periods or emergence dates of pollinators in the Presidio in response to climate change, Forister and Shapiro (2003, p. 1130) found that over a period of 31 years warmer and drier winter conditions were associated with earlier butterfly appearance in the Central Valley of California. The ability of *A. franciscana* to self-pollinate may be

limited (Parker 2011, p. 1); therefore, we expect that bumblebees, bees, and other insects are likely needed for *A. franciscana* to produce seed. Nitrogen enrichment of the soil from atmospheric deposition may encourage the growth of nonnative, invasive grasses in the vicinity of the wild plant. The grasses could, in turn, provide additional habitat for rodents such as California voles that feed on the wild plant.

Determination

We have carefully assessed the best scientific and commercial information available regarding past, present, and future threats to *Arctostaphylos franciscana*. The primary threat to *A. franciscana* is from the present or threatened destruction, modification, or curtailment of the species' habitat or range (Factor A). All original occupied habitat of the species has been lost, and its current range has been reduced to a single location that supports a single *A. franciscana* plant. The last wild plant was moved from its native habitat, which was subsequently destroyed during a highway construction project, and transplanted to natural habitat on the Presidio in San Francisco. Limited remaining suitable habitat is available to support a viable population of the species. Although greenstone and serpentine soils remain on the peninsula, the majority of this land has been fragmented and may be subject to edge effects and nitrogen deposition. Additionally, the possible transfer of Presidio lands to the GSA and the private sector may result in potential future loss of the plant or modification of its habitat.

Overutilization (Factor B) is a threat because the current known wild population consists of one individual plant, and *Arctostaphylos* plants are popular for landscaping and other horticultural purposes. *Arctostaphylos franciscana* is thus vulnerable to overcollection or damage if visitors harvest cuttings or seeds.

Disease and predation (Factor C) is also a threat to *Arctostaphylos franciscana*. Stress from transplanting the wild plant may have weakened the plant and made it more susceptible to disease and predation. The plant was heavily infested with a native leaf roller moth after being transplanted; however, the caterpillars and damaged foliage were removed and the plant has produced new foliage and flowers. Minor damage to *Arctostaphylos franciscana* branches from gnawing by California voles and other rodents has also been observed. Twig blight, a fungal infection, was observed on the plant during the winter of 2009–2010, but the infection subsided during the dry season. Infection by *Phytophthora* species, especially *Phytophthora cinnamomi*, is a serious and lethal problem among *Arctostaphylos* species in the wild and in the native plant nursery trade. *Phytophthora cinnamomi* cannot be controlled once introduced to a plant or habitat, and results in plant death. Many *A. franciscana* cuttings are being grown in commercial or university nurseries for outplanting with the wild plant. Although the use of clean propagation techniques has been requested by the staff in charge of the project, the risk of infection of the cuttings and wild plant by *P. cinnamomi* is still a threat. At least six other species of *Phytophthora* are also found south of the San Francisco peninsula and could be introduced into the vicinity of the wild plant. In addition, the pathogen that causes

sudden oak death has been discovered in the Presidio; however, the threat of this disease to *A. franciscana* is likely not severe.

Existing regulatory mechanisms (Factor D) afford certain protections for *Arctostaphylos franciscana* because the plant is located on lands administered by NPS, GGNRA, and the Presidio Trust. However, as mentioned above, these protections are not specific to *A. franciscana*. Because no existing regulatory mechanisms exist specific to *A. franciscana*, we do not consider the existing regulatory mechanisms to be inadequate to protect the species.

Other natural or manmade factors affecting *Arctostaphylos franciscana*'s continued existence (Factor E) include environmental effects resulting from climate change, alteration of the natural fire regime, soil compaction from visitor use, vandalism, loss of genetic diversity, stochastic events, small population size, loss of pollinators, and hybridization are also threats to this species. Changes in the climate are expected to include increased air temperature and reduced summer fog, both resulting in warmer and drier conditions to which the plant may be less well-adapted. Additionally, climate change may result in divergence between the timing of flowering of *A. franciscana* and the availability of suitable pollinators, negatively affecting the plant's ability to set seed. Climate change may also reduce pollinator species and numbers. Warming and drying of the plant's habitat would likely also increase the frequency of wildfire, which could result in death of the wild plant and its future seedlings if fire occurred before the plants were able to produce viable seeds. Loss of mature *Arctostaphylos* plants to fire is a natural

phenomenon; however, this species is currently represented by a single mature plant. Therefore, to our knowledge, the loss of the plant would result in extinction of the species in the wild. Loss of genetic diversity has likely already occurred due to the reduction of the species to a single wild plant and is expected to continue because this generally outcrossing species will be limited to self-pollination. Reduced genetic diversity may also limit the species' ability to adapt to changes in habitat, such as those resulting from climate change or loss of pollinators. The species is extremely vulnerable to stochastic events such as droughts, storm damage, and fires, from which large wide-ranging populations can generally recover, but which would likely drive a species consisting of a single plant to extinction.

Based on our evaluation of the best available scientific and commercial information regarding the past, present, and future threats faced by *Arctostaphylos franciscana*, we have determined that the continued existence of *A. franciscana* is threatened by overutilization for commercial and recreational purposes, disease, and predation, climate change, alteration of the natural fire regime, soil compaction from visitor use, vandalism, loss of genetic diversity, stochastic events, small population size, loss of pollinators, and hybridization. Because the species faces these threats throughout its extremely limited range, we find that *A. franciscana* is in danger of extinction throughout its entire range and, therefore, it is unnecessary to analyze its status in any significant portion of its range.

The Act defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range. The species in the wild currently exists as a single plant on the San Francisco Presidio. Because the range of the species is restricted to a single plant, the risks presented by the threats discussed herein are more intensified than they would be were the species more widespread or numerous. Based on our evaluation of the best available scientific and commercial information, and given the current population size (one wild plant) and severely limited distribution throughout its historical range, we have determined the species is currently on the brink of extinction in the wild and therefore is in danger of extinction throughout all of its range. As a result, this species meets the definition of an endangered species under the Act. Because the species is in danger of extinction now due to its limited population size and the severity of existing threats, as opposed to in the foreseeable future, *A. franciscana* meets the definition of an endangered species rather than a threatened species. On the basis of our careful evaluation of the best available scientific and commercial information regarding the past, present, and future threats to the species as discussed above relative to the listing factors, we are listing *Arctostaphylos franciscana* as an endangered species throughout its range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection,

and prohibitions against certain practices. Recognition through listing results in public awareness and conservation by Federal, State, and local agencies; private organizations; and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection measures required of Federal agencies and the prohibitions against certain activities are discussed, in part, below.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both, as described in the preceding paragraph, include land management, road construction, and any other landscape altering activities, such as invasive tree and

plant removal, within the known range of the species or within any designated critical habitat.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered plants. All prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.61, apply. When this final rule becomes effective (see **DATES** section above), *Arctostaphylos franciscana*, the last wild specimen (including any plants propagated from the wild plant) and the botanical garden specimens (those plants previously collected from the wild and subsequently propagated), will be protected by all prohibitions of section 9(a)(2) of the Act, which protects listed plants in areas of Federal jurisdiction such as the Presidio. Plants that have been or are being sold in the nursery trade or have been transplanted into home gardens will not be considered part of the listed entity.

These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale in interstate or foreign commerce, or remove and reduce the species to possession from areas under Federal jurisdiction. In addition, for plants listed as endangered, the Act prohibits the malicious damage or destruction on areas under Federal jurisdiction and the removal, cutting, digging up, or damaging or destroying of such plants in knowing violation of any State law or regulation, including State criminal trespass law. Certain exceptions to the prohibitions apply to agents of the Service and State conservation agencies.

Arctostaphylos franciscana has not been listed by the State of California. Listing also requires Federal agencies to avoid actions that might jeopardize the species (16 U.S.C. 1536(a)(2)), and provides opportunities for funding of conservation measures and land acquisition that would not otherwise be available to them (16 U.S.C. 1534, 1535(d)).

We may issue permits to carry out otherwise prohibited activities involving endangered and threatened wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.62 for endangered plants, and at 17.72 for threatened plants. With regard to endangered plants, a permit must be issued for the following purposes: for scientific purposes or for enhancing the propagation or survival of the species, and for take to prevent undue economic hardship (see 50 CFR 17.63).

Required Determinations

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain any new collections of information that require approval by Office of Management and Budget (OMB) under the Paperwork Reduction Act. This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), need not be prepared in connection with regulations pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of all references cited in this rule is available on the Internet at <http://www.regulations.gov> or upon request from the Field Supervisor, Sacramento Fish and Wildlife Office (see **ADDRESSES**).

Authors

The primary authors of this document are the staff members of the Sacramento Fish and Wildlife Office (see **ADDRESSES**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. Amend §17.12(h) by adding an entry for “*Arctostaphylos franciscana*” (Franciscan manzanita) to the List of Endangered and Threatened Plants in alphabetical order under FLOWERING PLANTS, to read as follows:

§ 17.12 Endangered and threatened plants.

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(h) * * *

Species		Historic range	Family	Status	When listed	Critical habitat	Special rules
Scientific name	Common name						

FLOWERING PLANTS

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<i>Arctostaphylos franciscana</i>	Franciscan manzanita	U.S.A. (CA)	Ericaceae	E	809	NA	NA
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Dated: August 24, 2012

Signed: Rowan W. Gould

Acting Director, U.S. Fish and Wildlife Service

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